Kv to Cv Conversion and Valve Flow

Converts a valve flow coefficient between Kv (m³/h at 1 bar) and Cv (US gpm at 1 psi), and gives the liquid flow through the valve at a pressure drop.

Method: Definitions of Kv and Cv

Input parameters

Unit system: SI

Parameter	Value	Unit
Coefficient known	Kv	
Value of the known coefficient	100.00	
Pressure drop across the valve	1.0000	bar
Specific gravity of the liquid (water = 1)	1.0000	

Calculated results

Parameter	Value	Unit
Kv	100.00	
Cv	115.61	
Liquid flow at the pressure drop	100.00	m³/h

Notes for this case

- Non-choked, non-flashing liquid flow; for sizing with choked flow or gases use the IEC 60534 control valve calculators.

Formula and method

$$K_v = 0.865\, C_v$$

$$Q = K_v \sqrt{\frac{\Delta p / 1\,\mathrm{bar}}{SG}} \ \mathrm{m^3/h}$$

Variables

known	which coefficient is known	-
K	value of the known coefficient	-
Δp	pressure drop	Pa
SG	specific gravity	-
K_v	Kv: m³/h at 1 bar drop	-
C_v	Cv: US gpm at 1 psi drop	-
Q	liquid flow	m³/s

Method and standards

Kv is the flow of water in m³/h at a 1 bar drop; Cv is US gallons per minute at a 1 psi drop. The ratio follows from the exact unit definitions: Kv = Cv × 0.2271 m³/h per gpm × √(14.504 psi per bar) = 0.865 Cv (flow rises with the square root of the pressure drop, from 1 psi to 1 bar).

Assumptions and limits

- Turbulent, non-choked liquid flow.

References

- Definitions of Kv and Cv

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/instrumentation/control-valves/kv-cv-conversion

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.